IN THE CLAIMS

We claim:

1. A process, comprising:

providing a substrate;

applying an anti-reflective coating comprising a radiation path altering additive above the substrate;

applying a photoresist above the anti-reflective coating; and

patterning the photoresist with radiation.

2. The process of claim 1, wherein applying an anti-reflective coating comprises applying a polymer-based material containing a reflective material.

3. The process of claim 1, wherein applying an anti-reflective coating comprises applying a polymer-based material containing a refractive material.

4. The process of claim 1, wherein applying an anti-reflective coating comprises applying a polymer-based material containing a core-shell material.

5. The process of claim 1, wherein patterning the photoresist with radiation comprises irradiating the photoresist with light having a wavelength selected from the group consisting of 365nm, 248nm, 193nm, 157nm, and 13.5nm.

6. The process of claim 1, wherein patterning the photoresist with radiation comprises irradiating the photoresist with electrons.

7. The process of claim 1, further comprising etching the substrate to form a first opening.

8. The process of claim 7, further comprising:

applying a sacrificial anti-reflective coating comprising a radiation path altering additive over the substrate and the first opening such that the first opening is filled with the sacrificial anti-reflective coating;

applying a photoresist over the sacrificial anti-reflective coating;

patterning the photoresist;

etching the substrate and the sacrificial anti-reflective material over the first opening to form a second opening; and

filling the first opening and the second opening with a metal.

9. A method, comprising:

providing a substrate;

applying an anti-reflective coating comprising a plurality of core-shell particles above the substrate;

applying a photoresist above the anti-reflective coating; and

patterning the photoresist with light.

10. The method of claim 9, wherein the plurality of core-shell particles refract light within the anti-reflective coating during the patterning of the photoresist with light.

11. The method of claim 9, wherein the plurality of core-shell particles refract and reflect light within the anti-reflective coating during the patterning of the photoresist with light.

12. A method, comprising:

applying a bottom anti-reflective coating comprising a polymer and a plurality of refractive polymer beads;

applying a photoresist above the anti-reflective coating;

patterning the photoresist;

etching the substrate to form a first opening.

applying a sacrificial anti-reflective coating comprising a spin-on-polymer and a plurality of refractive polymer beads over the substrate and the first opening such that the first opening is filled with the sacrificial anti-reflective coating;

applying a photoresist over the sacrificial anti-reflective coating;

patterning the photoresist;

etching the substrate and the sacrificial anti-reflective material over the first opening to form a second opening; and

filling the first opening and the second opening with a metal.

13. The method of claim 12, wherein the plurality of refractive polymer beads have a core-shell structure comprising an inorganic reflective core and an organic refractive shell.

14. The method of claim 12, wherein the plurality of refractive polymer beads have a core-shell structure comprising an absorbent core and an organic refractive shell.

15. A method, comprising:

improving critical dimension control of a substrate patterned by photolithography by including a radiation path altering additive in an anti-reflective coating.

16. The method of claim 15, wherein the radiation path altering additive in the anti-reflective coating prevents radiation from reentering a photoresist to an extent sufficient to prevent standing waves in the photoresist.

17. The method of claim 15, wherein the radiation path altering additive scatters light within the anti-reflective coating.

18. An anti-reflective coating, comprising:

a base material; and

an additive to alter a radiation beam path.

19. The anti-reflective coating of claim 18, wherein the additive to alter the radiation beam path is a reflective particle.

20. The anti-reflective coating of claim 19, wherein the reflective particle is selected from the group consisting of zinc oxide, titanium dioxide, calcium carbonate, diatomaceous earth, and zirconia.

21. The anti-reflective coating of claim 18, wherein the additive to alter the radiation beam path is a refractive particle.

22. The anti-reflective coating of claim 18, wherein the refractive particle is a solid polymer shell.

23. The anti-reflective coating of claim 18, wherein the additive to alter the radiation beam path is a core-shell particle.

24. The anti-reflective coating of claim 18, wherein the base material comprises an inorganic material.

25. The anti-reflective coating of claim 18, wherein the additive to alter the radiation beam path is a multi-layer mirror.

26. The anti-reflective coating of claim 18, further comprising a surfactant to separate pigments.

27. The anti-reflective coating of claim 18, wherein the anti-reflective coating is a bottom anti-reflective coating (BARC).

28. The anti-reflective coating of claim 18, wherein the anti-reflective coating is a sacrificial anti-reflective coating.

29. The anti-reflective coating of claim 28 above, wherein the base material is a spin-on-glass (SOG).

30. The anti-reflective coating of claim 28 above, wherein the base material is a spin-on-polymer (SOP).